Complete Summary

GUIDELINE TITLE

Hip & pelvis (acute & chronic).

BIBLIOGRAPHIC SOURCE(S)

Work Loss Data Institute. Hip & pelvis (acute & chronic). Corpus Christi (TX): Work Loss Data Institute; 2008. 163 p. [174 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Work Loss Data Institute. Hip & pelvis (acute & chronic). Corpus Christi (TX): Work Loss Data Institute; 2007 May 9. 147 p.

The *Official Disability Guidelines* product line, including *ODG Treatment in Workers Comp*, is updated annually, as it has been since the first release in 1996.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory information has been released.

- February 28, 2008, Heparin Sodium Injection: The U.S. Food and Drug Administration (FDA) informed the public that Baxter Healthcare Corporation has voluntarily recalled all of their multi-dose and single-use vials of heparin sodium for injection and their heparin lock flush solutions. Alternate heparin manufacturers are expected to be able to increase heparin production sufficiently to supply the U.S. market. There have been reports of serious adverse events including allergic or hypersensitivity-type reactions, with symptoms of oral swelling, nausea, vomiting, sweating, shortness of breath, and cases of severe hypotension.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Work-related injuries of the hip and pelvis

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Treatment

CLINICAL SPECIALTY

Chiropractic
Emergency Medicine
Family Practice
Internal Medicine
Orthopedic Surgery
Physical Medicine and Rehabilitation

INTENDED USERS

Advanced Practice Nurses
Health Care Providers
Health Plans
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To offer evidence-based step-by-step decision protocols for the assessment and treatment of workers' compensation conditions

TARGET POPULATION

Workers with occupational injuries of the hip and pelvis

INTERVENTIONS AND PRACTICES CONSIDERED

The following interventions/procedures were considered and recommended as indicated in the original guideline document:

1. Acetaminophen (paracetamol)
2. Acupuncture for osteoarthritis
3. Anesthesia for surgical procedures
4. Aquatic therapy
5. Arthroplasty when all reasonable conservative measures have been exhausted
6. Arthroscopy when a surgical lesion is suspected
7. Bed rest
8. Bone-growth stimulators/ultrasound fracture healing for non-union of long bone fractures
9. Bone scan (radioisotope bone scanning)
10. Calcium phosphate cement when used for augmentation in unstable trochanteric fractures
11. Chiropractic treatment/manipulation
12. Closed reduction
13. Computer-aided training as a tool in orthopedic rehabilitation
14. Epidural analgesia for early postoperative pain relief
15. Exercise
16. External fixation when internal fixation is not possible or practical
17. Femoral nerve block
18. Fondaparinux
19. Heparin
20. Hospital stay following hip surgery (see common hospital length of stay averages in original guideline document)
21. Hydrotherapy for treatment of osteoarthritis in the hip
22. Internal fixation/compression hip screw
23. Non-steroidal anti-inflammatory drugs (NSAIDS) as a second line of therapy
24. Open reduction for hip fractures
25. Osteotomy
26. Patient education
27. Physical therapy/occupational therapy
28. Positron emission tomography (PET)
29. Prophylaxis (antibiotic and anticoagulant) in conjunction with hip surgery
30. Protein and energy supplementation
31. Psoas blocks/piriformis injections after one-month physical therapy trial
32. Radiography (diagnostic):
    - X-ray
    - Arthrography for suspected labral tears
    - Computed tomography (CT)
    - Magnetic resonance imaging (MRI)
33. Radiotherapy
34. Return to work
35. Revision total hip arthroplasty for failed hip replacement or internal fixation
36. Sacroiliac joint injections (SJI)/sacroiliac joint blocks
37. Sacroiliac support belt
38. Sliding hip screw
39. Tranexamic acid for reducing blood loss in total hip arthroplasty
40. Transcutaneous electrical nerve stimulation (TENS) as a treatment for pain
41. Ultrasound (sonography)
42. Viscosupplementation
43. Vitamin D in older people susceptible to hip injuries

44. Walking aids (canes, crutches, braces, orthoses, and walkers)
45. Work conditioning, work hardening
46. Zoledronic acid after repair of a hip fracture

The following interventions/procedures are under study and are not specifically recommended:

1. Sacroiliac joint debridement (SJD)
2. Traction (manual)

The following interventions/procedures were considered, but are not recommended:

1. Closed suction drainage
2. Enoxaparin
3. Glucosamine and chondroitin sulphate
4. Hip protectors
5. Intraarticular steroid hip injection (IASHI)
6. Sacroiliac joint fusion (except as a last resort as indicated in the original guideline document)
7. Sacroiliac joint radiofrequency neurotomy

MAJOR OUTCOMES CONSIDERED

- Diagnostic value of tests
- Effectiveness of treatments in relieving pain, improving stability, restoring normal function, and improving survival

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Work Loss Data Institute (WLDI) conducted a comprehensive medical literature review (now ongoing) with preference given to high quality systematic reviews, meta-analyses, and clinical trials published since 1993, plus existing nationally recognized treatment guidelines from the leading specialty societies. WLDI primarily searched MEDLINE and the Cochrane Library. In addition, WLDI also reviewed other relevant treatment guidelines, including those in the National Guideline Clearinghouse, as well as state guidelines and proprietary guidelines maintained in the WLDI guideline library. These guidelines were also used to suggest references or search terms that may otherwise have been missed. In addition, WLDI also searched other databases, including MD Consult, eMedicine, CINAHL, and conference proceedings in occupational health (i.e., American College of Occupational and Environmental medicine [ACOEM]) and disability evaluation (i.e., American Academy of Disability Evaluating Physicians [AADEP], American Board of Independent Medical Examiners [ABIME]). Search terms and

questions were diagnosis, treatment, symptom, sign, and/or body-part driven, generated based on new or previously indexed existing evidence, treatment parameters and experience.

In searching the medical literature, answers to the following questions were sought: (1) If the diagnostic criteria for a given condition have changed since 1993, what are the new diagnostic criteria? (2) What occupational exposures or activities are associated causally with the condition? (3) What are the most effective methods and approaches for the early identification and diagnosis of the condition? (4) What historical information, clinical examination findings or ancillary test results (such as laboratory or x-ray studies) are of value in determining whether a condition was caused by the patient's employment? (5) What are the most effective methods and approaches for treating the condition? (6) What are the specific indications, if any, for surgery as a means of treating the condition? (7) What are the relative benefits and harms of the various surgical and non-surgical interventions that may be used to treat the condition? (8) What is the relationship, if any, between a patient's age, gender, socioeconomic status and/or racial or ethnic grouping and specific treatment outcomes for the condition? (9) What instruments or techniques, if any, accurately assess functional limitations in an individual with the condition? (10) What is the natural history of the disorder? (11) Prior to treatment, what are the typical functional limitations for an individual with the condition? (12) Following treatment, what are the typical functional limitations for an individual with the condition? (13) Following treatment, what are the most cost-effective methods for preventing the recurrence of signs or symptoms of the condition, and how does this vary depending upon patient-specific matters such as underlying health problems?

Criteria for Selecting the Evidence

Preference was given to evidence that met the following criteria: (1) The article was written in the English language, and the article had any of the following attributes: (2) It was a systematic review of the relevant medical literature, or (3) The article reported a controlled trial – randomized or controlled, or (4) The article reports a cohort study, whether prospective or retrospective, or (5) The article reports a case control series involving at least 25 subjects, in which the assessment of outcome was determined by a person or entity independent from the persons or institution that performed the intervention the outcome of which is being assessed.

More information about the selection of evidence is available in "Appendix. ODG Treatment in Workers' Comp. Methodology description using the AGREE instrument" (see "Availability of Companion Documents" field).

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Ranking by Type of Evidence

1. Systematic Review/Meta-Analysis
2. Controlled Trial-Randomized (RCT) or Controlled
3. Cohort Study-Prospective or Retrospective
4. Case Control Series
5. Unstructured Review
6. Nationally Recognized Treatment Guideline (from www.guideline.gov)
7. State Treatment Guideline
8. Other Treatment Guideline
9. Textbook
10. Conference Proceedings/Presentation Slides

Ranking by Quality within Type of Evidence

a. High Quality
b. Medium Quality
c. Low Quality

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The Work Loss Data Institute (WLDI) reviewed each article that was relevant to answering the question at issue, with priority given to those that met the following criteria: (1) The article was written in the English language, and the article had any of the following attributes: (2) It was a systematic review of the relevant medical literature, or (3) The article reported a controlled trial – randomized or controlled, or (4) The article reported a cohort study, whether prospective or retrospective, or (5) The article reported a case control series involving at least 25 subjects, in which the assessment of outcome was determined by a person or entity independent from the persons or institution that performed the intervention the outcome of which is being assessed.

Especially when articles on a specific topic that met the above criteria were limited in number and quality, WLDI also reviewed other articles that did not meet the above criteria, but all evidence was ranked using the methodology described above (see the Rating Scheme of the Strength of Evidence field) so that the quality of evidence could be clearly determined when making decisions about what to recommend in the Guidelines. Articles with a Ranking by Type of Evidence of Case Reports and Case Series were not used in the evidence base for the Guidelines. These articles were not included because of their low quality (i.e., they tend to be anecdotal descriptions of what happened with no attempt to control for variables that might affect outcome). Not all the evidence provided by WLDI was eventually listed in the bibliography of the published Guidelines. Only the higher quality references were listed. The criteria for inclusion was a final ranking of 1a

to 4b (the original inclusion criteria suggested the methodology subgroup), or if the Ranking by Type of Evidence was 5 to 10, the quality ranking should be an "a."

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

Guideline developers reviewed published cost analysis.

METHOD OF GUIDELINE VALIDATION

External Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Prior to publication, select organizations and individuals making up a cross-section of medical specialties and typical end-users externally reviewed the guideline.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Initial Diagnosis

- First visit: with Primary Care Physician MO/DO or to emergency care
- Determine cause: initial evaluation:
    - Determine the type of trauma (fall, motor vehicle accident, etc.)
    - Determine patient history and whether the problem is acute, subacute, chronic, or of insidious onset
    - Determine the severity and specific anatomic location of the pain
    - Assess the ability of the patient to walk and assess range of motion
    - Search for evidence of an open or penetrating wound
    - Determine any present medication, co-morbidities or pre-existing conditions (including pregnancy, anemia, etc.) that may affect medication or surgery
- Initial diagnosis:
    - Traumatic (see "Fractures" or "Dislocations" below)
        - Fractures or Dislocations (see the original guideline document for International Classification of Diseases, Ninth Revision [ICD-9] codes for this and other diagnoses)
        - Avascular necrosis (the death of bone tissue due to a lack of blood supply most often affects the head of femur, causing hip pain)

- Other (see "Conservative Treatment" below)
    - Sprain or contusion
    - Laceration
    - Coccygodynia
    - Sacroiliitis
    - Hip overuse syndrome

Management in Accident & Emergency

Early assessment, in accident & emergency or on the ward, should include a formal recording of:

- Pressure sore risk
- Hydration and nutrition
- Fluid balance
- Pain
- Core body temperature using a low reading thermometer
- Continence
- Co-existing medical problems
- Mental state
- Previous mobility
- Previous functional ability
- Social circumstances

Fractures and Dislocations

Fractures

Possible Causes

- Trauma (most common)
- Lytic lesions (cancerous metastasis, Paget disease, bone cysts)
- Osteoporosis

Patients admitted to accident & emergency with a suspected hip fracture should be managed as follows:

- Use soft surfaces to protect the heel and sacrum from pressure damage
- Keep the patient warm
- Administer pain relief to allow for regular, comfortable change of patient position
- Instigate early radiology
- Measure and correct any fluid and electrolyte abnormalities

Patients should be transferred to the ward within two hours of their arrival in accident and emergency.

See "Imaging Studies" below.

Hip Fracture Classifications

Determine the anatomic locations (head, neck, intertrochanteric, trochanteric, and subtrochanteric) and note whether it is intracapsular or extracapsular. Femoral head and neck fractures are considered intracapsular, while trochanteric, intertrochanteric, and subtrochanteric fractures are considered extracapsular. Intracapsular hip fractures frequently have complicated healing.

Preoperative Care

Patients should be operated on as soon as possible (within 24 hours).

All patients undergoing hip fracture surgery should receive antibiotic prophylaxis.

Patients should have clinical and laboratory assessment of possible hypovolaemia and electrolyte balance, and deficiencies appropriately and promptly corrected.

Oxygen saturation should be checked on admission. Supplementary oxygen should be administered to all patients with hypoxemia.

Anaesthetic Management

Regional anesthesia is recommended for patients undergoing hip fracture repair, providing there are no specific indications for general anesthesia or contraindications to regional anesthesia.

Surgical Management

Most undisplaced intracapsular hip fractures that are treated surgically should have internal fixation, except in the very elderly, when hemiarthroplasty may be considered.

Extracapsular hip fractures should all be treated surgically unless there are medical contraindications.

Femoral Head Fractures

Type 1 (single fragment fractures): Reduce dislocated femoral head and fracture fragment as soon as possible to avoid avascular necrosis of fracture fragment. Early orthopedic consultation is a must. Small fracture fragments may need to be removed.

Type 2 (comminuted fractures): Early orthopedic consultation for admission and arthroplasty is recommended.

Femoral Neck Fractures

Type 1 (stress fractures or incomplete fractures): Some practitioners handle these fractures nonoperatively with initial immobilization in selected patients, while others prefer operative treatment in all patients.

Types 2, 3, and 4 (impacted fractures, partially displaced fractures, completely displaced or comminuted fractures): Management usually includes internal fixation or arthroplasty; however selected cases of impacted fracture can be treated conservatively. Early orthopedic consultation is recommended.

Intertrochanteric Fractures

Note potential for significant blood loss. Intravenous (IV) fluid resuscitation may be necessary.

Stable and unstable fractures usually are treated with open reduction and internal fixation unless patient is not an operative candidate for other reasons.

Early orthopedic consultation is recommended.

Trochanteric Fractures

Type 1 (nondisplaced fractures): Management is most often conservative, and orthopedic consultation is recommended.

Type 2 (displaced fracture): These usually are treated with reduction and internal fixation, except in older or debilitated patients in whom conservative treatment is appropriate.

Subtrochanteric Fractures

Significant hemorrhage is common, and IV fluid resuscitation is frequently necessary.

Emergency department (ED) application of traction or traction splint is necessary.

Consult orthopedic surgeon for admission and open reduction with internal fixation for most patients.

Dislocations

Possible Causes

- Trauma (most common)
- Congenital disorder

A hip dislocation requires immediate pain management, full medical screening examination, and reduction of the dislocation within 6 to 12 hours. The incidence of subsequent avascular necrosis (AVN) of the femoral head is a time-dependent phenomenon, one most likely to occur if relocation is delayed beyond 6 hours.

See "Imaging Studies" below.

Determine type of dislocation:

Anterior Hip Dislocation

Anterior dislocation of the hip occurs from a direct blow to the posterior aspect of the hip or, more commonly, from a force applied to an abducted leg that levers the hip anteriorly out of the acetabulum. Because of the mechanism of force causing this dislocation, the patient should also be evaluated for femur fractures, ligamentous stability, and pelvic fractures.

Central Hip Dislocation

Central dislocations occur when a direct impact to the lateral aspect of the hip forces the hip centrally through the acetabulum into the pelvis. This is a fracture-dislocation.

Posterior Hip Dislocation (90% of all hip dislocations)

Posterior dislocations occur when the knee and hip are flexed and a posterior force is applied at the knee. Conduct a full medical screening, including examination of the knee, foot and ankle joints.

Closed reduction is recommended for hip dislocation if possible.

Indications for open reduction include:

- Irreducible dislocation (approximately 10% of all dislocations)
- Persistent instability of the joint following reduction (e.g., fracture-dislocation of the posterior acetabulum)
- Fracture of the femoral head or shaft
- Neurovascular deficits that occur after closed reduction

Imaging Studies for Fractures and Dislocations

Plain Radiography

- Plain radiographs of the pelvis should routinely be obtained in patients with a severe mechanism of injury, such as a motor vehicle accident (MVA) or fall from a substantial height. Pelvic fractures may occur in as many as 10% of patients.

Computed Tomography (CT)

- CT scan of the hip is accurate in delineating the extent and nature of acetabular and hip fractures and dislocations.
- If the patient's condition is sufficiently stable and if surgical repair is contemplated, CT scans provide essential information for the orthopedist.
- The severity of acetabular fractures tends to be underestimated on plain radiographs, which are therefore less useful than CT scans in this situation.

Magnetic Resonance Imaging (MRI)

- MRI of the hip is usually impractical in the initial evaluation of a trauma patient. It is, however, the best imaging modality in detecting and assessing AVN of the hip and in detecting nondisplaced stress fractures of the femoral neck.
- MRI is also useful in the diagnosis of bone tumors, osteomyelitis, osteoarthritis, and congenital abnormalities of the hip joint.

Conservative Treatment

Conservative treatment applies to most cases of osteoarthritis, inflammatory arthritis, strains and sprains, tendonitis and non-displaced trochanteric fractures.*

Minor Injuries

Following MRI or ultrasonography, rest, ice, compression, and physical therapy are recommended.

Arthritic Conditions

Oral analgesics and exercise are recommended. Joint arthroplasty may be needed for end stage osteoarthritis. Following progression of inflammatory arthritis, anti-rheumatic drugs may be prescribed.

*Most non-displaced greater trochanteric fractures can be treated conservatively with protected weight bearing on the affected leg until the symptoms resolve. However, a nondisplaced greater trochanteric fracture that results from a fall needs to be evaluated to confirm that the fracture does not extend into the intertrochanteric region, which could result in displacement of the fracture. To evaluate the fracture, limited MRI or a bone scan may be useful. If the trochanteric fracture involves a large, completely displaced, and mechanically significant fragment of bone, it may require reduction and fixation.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

During the comprehensive medical literature review, preference was given to high quality systematic reviews, meta-analyses, and clinical trials over the past ten years, plus existing nationally recognized treatment guidelines from the leading specialty societies.

The heart of each Work Loss Data Institute guideline is the Procedure Summary (see the original guideline document), which provides a concise synopsis of effectiveness, if any, of each treatment method based on existing medical evidence. Each summary and subsequent recommendation is hyper-linked into the studies on which they are based, in abstract form, which have been ranked, highlighted and indexed.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

These guidelines unite evidence-based protocols for medical treatment with normative expectations for disability duration. They also bridge the interests of the many professional groups involved in diagnosing and treating work-related injuries of the hip and pelvis.

POTENTIAL HARMS

- Acetaminophen has been associated with liver toxicity in overdose situations or in chronic alcohol use.
- One high quality review concluded that in comparison with internal fixation, arthroplasty for the treatment of a displaced femoral neck fracture significantly reduces the risk of revision surgery, but could cause greater infection rates, blood loss, and operative time and possibly an increase in early mortality rates.
- Results showed an increased risk of cut-out, non-union, implant breakage and re-operation for fixed nail plates in comparison with the sliding implants. In addition patients treated with fixed nail plates had a higher mortality and the survivors were more likely to have residual pain in the hip and impaired mobility.
- Iatrogenic femoral fractures associated with the use of dynamic screw-intramedullary nail (DSIN) devices represent a rare, but persistent, risk.
- Early or open reduction of hip fractures may not reduce the risk of non-union (NU) or avascular necrosis (AVN). There is a suggestion of a higher incidence of NU following open reduction than closed reduction.
- Liver and renal function should be monitored at least every six months in patients on chronic nonsteroidal anti-inflammatory drugs (NSAIDs). NSAIDs should be used with caution among patients with cardiovascular risk factors. Long-term use of NSAIDs should be avoided if possible.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

The Treatment Planning sections outline the most common pathways to recovery, but there is no single approach that is right for every patient and these protocols do not mention every treatment that may be recommended. See the Procedure Summaries (in the original guideline document) for complete lists of the various options that may be available, along with links to the medical evidence.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Patient Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006 (revised 2008 May 7)

GUIDELINE DEVELOPER(S)

Work Loss Data Institute - Public For Profit Organization

SOURCE(S) OF FUNDING

Not stated

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Editor-in-Chief, Philip L. Denniston, Jr. and Senior Medical Editor, Charles W. Kennedy, Jr., MD, together pilot the group of approximately 80 members. See the ODG *Treatment in Workers Comp* Editorial Advisory Board.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

There are no conflicts of interest among the guideline development members.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Work Loss Data Institute. Hip & pelvis (acute & chronic). Corpus Christi (TX): Work Loss Data Institute; 2007 May 9. 147 p.

The *Official Disability Guidelines* product line, including *ODG Treatment in Workers Comp*, is updated annually, as it has been since the first release in 1996.

GUIDELINE AVAILABILITY

Electronic copies: Available to subscribers from the Work Loss Data Institute Web site.

Print copies: Available from the Work Loss Data Institute, 169 Saxony Road, Suite 210, Encinitas, CA 92024; Phone: 800-488-5548, 760-753-9992, Fax: 760-753-9995; www.worklossdata.com.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Background information on the development of the Official Disability Guidelines of the Work Loss Data Institute is available from the Work Loss Data Institute Web site.
- Appendix A. ODG Treatment in Workers' Comp. Methodology description using the AGREE instrument. Available to subscribers from the Work Loss Data Institute Web site.

PATIENT RESOURCES

The following is available:

- Appendix C. ODG Treatment in Workers' Comp. Patient information resources. 2008.

Electronic copies: Available to subscribers from the Work Loss Data Institute Web site.

Print copies: Available from the Work Loss Data Institute, 169 Saxony Road, Suite 210, Encinitas, CA 92024; Phone: 800-488-5548, 760-753-9992, Fax: 760-753-9995; www.worklossdata.com.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By

providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This NGC summary was completed by ECRI on April 13, 2006. This NGC summary was updated by ECRI on November 10, 2006 and March 30, 2007. This summary was updated by ECRI Institute on June 22, 2007 following the U.S. Food and Drug Administration (FDA) advisory on heparin sodium injection. This NGC summary was updated by ECRI Institute on August 27, 2007. This summary was updated by ECRI Institute on March 14, 2008 following the updated FDA advisory on heparin sodium injection. This NGC summary was updated by ECRI Institute on January 21, 2009.

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